

emy of Natural Sciences of Philadelphia, the editors of the Medical Journal, News and Library, and Penn Monthly, Mr. Eli K. Price, the Secretary of the U. S. Treasury, the Department of the Interior, the Engineer Department, and the Librarian of Congress.

Mr. B. S. Lyman offered for publication, in the Transactions, a map of the Punjaub Oil region, with explanatory text. On motion, this paper was referred to a committee, consisting of Dr. Genth, Mr. Lesley and Dr. Horn.

Mr. Cope communicated the following paper on a new Testudinate from the chalk of Kansas.

On a new Testudinate from the Chalk of Kansas.

BY E. D. COPE.

(Read before the American Philosophical Society, Jan. 19, 1872.)

Associated with the remains of *Clidastes*, and other saurians, and at a distance of two or three hundred yards from the locality of the fossil *Protostega gigas*, were found some vertebræ of a Testudinate reptile, which approaches the type of *Trionyx* and *Chelydra*. It differs so strikingly from both, and from all others yet known, as to require notice, and as the parts preserved (caudal vertebræ) are those most likely to recur in a well-preserved state in strata of this age, I propose to establish a species and genus on them, to aid in the future identification of both strata and animal type.

The vertebræ have elongate centra concave below, and have well-developed diapophyses. A more anterior has transversely oval articular extremities; in another they are much less depressed. The former is the more anterior, being known as such by its larger diapophyses and much smaller articular surfaces for chevron bones; it appears probable, indeed, that this one has been without these appendages. It is, therefore, from the anterior part of the series, from no great distance behind the sacrum. Its position being thus determined, it may be described in detail as follows:

As observed, the centrum is elongate and depressed. The inferior surface at the cup is flat, but is arched upwards, descending again to the rim of the ball. The posterior two-thirds has a median groove, which terminates in a deep notch of the ball, which involves one-third of its vertical diameter, and widens backwards. The ball is transverse oval, and only moderately convex; near its upper margin a small deep pit interrupts its surface, having the appearance of an unusually large ligamentous insertion; its border slightly excavates the margin of the ball. The cup is a transverse oval, wider below. Its inferior and superior margins are so deeply (but openly) emarginate, as to reduce the concavity in the vertical direction very much. From the superior emargina-

tion, a deep groove descends to below the middle, probably for ligamentous insertion. The neural canal is subtrilateral. The neural arch is as usual in this group deeply emarginate in front, and much prolonged behind. The zygapophyses project beyond the ball, and the arch is contracted in front of them. Its upper surface has neither process nor keel, but is rugose for ligamentous and muscular insertion. The diapophyses have a wide base, and are subcylindric.

The surface is delicately reticulate rugose, coarsely rugose on the external faces of the zygapophyses. There are several small pneumatic foramina, the largest being in the bottom of the groove of the lower face.

Another vertebra differs in being rather more slender, and in having an obtuse keel of the neural arch. The pit of the ball is wanting, and the inferior emargination. The chevron articulations are larger, and the groove of the cup occupies the middle, instead of the upper half of the cup.

| | <i>Measurements.</i> | M. |
|---|----------------------|------|
| Length of centrum (greatest)..... | | 0.27 |
| Length of centrum | } | |
| vertical..... | | .01 |
| horizontal..... | | .017 |
| Elevation top neural arch above floor neural canal..... | | .013 |
| Length of arch on median line above..... | | .02 |
| Width " in front of posterior zygapophyses..... | | .012 |

A metacarpal or metatarsal-bone, was found near though not with the vertebræ, and probably belongs to the same animal. If metatarsal, it is much stouter than in *Trionyx*, but is more likely to be metacarpal. It is about as long as the vertebræ, centrum and arch together. The proximal end is transversely truncate, compressed L-shaped; the shaft compressed sub-quadrate, the articular extremely hour-glass shaped, with an inferior projection for the insertion of a flexor ligament. Length, M. .034; proximal diameter, .013.

These vertebræ indicate a genus with elongate tail like that of *Chelydra*, or probably longer; but they differ from those in that genus, by their procoelian character. An approach to the incised margins is to be found in *Trionyx*; but in those of that genus, where this character appears, the diapophyses are largely developed. The genus is evidently quite distinct from anything known, and we await further remains with interest. The species is much smaller than the *Protostega gigas*, and about equal to the Mississippi *Macrochelys*.

It may be called CYNOCERCUS INCISUS. The remains on which it is established were found by Sergeant Wm. Gardner, of my geological expedition in Kansas, in the yellow chalk near to Butte's Creek, south of Fort Wallace.

The discovery of this species and of the *Protostega* constitutes the first indication of the existence of *Testudinata* in the cretaceous formation of Kansas. The author originally pointed out the existence in it of

Sauroptergia and *Pythonomorpha*, and during the expedition just mentioned, obtained portions of *pterodactyles* and of a crocodilian of the genus *Hyposaurus*. The latter order has not been previously known from that region, and their remains are not common. Prof. Marsh's exploration in the Cretaceous of Kansas added *Pterosauria*, but he has not reported any *Crocodylia*, as I once thought, and incorrectly stated. (Proc. Am. Phil. Soc. 1871, p. 174.) The crocodile may be called *Hyposaurus webbianus* in recollection of Dr. Wm. E. Webb, of Topeka; it is similar in size to the *H. rogersii* of New Jersey.

An anterior cervical vertebra presents the following characteristics: It is that one in which the parapophysis occupies a position opposite the lower third of the vertical diameter. In it the centrum is stout in form, the articular faces but little concave, the posterior a little more so than the anterior. The anterior is almost regularly hexagonal, the posterior sub-round, a little deeper than wide. The inferior surface possesses a strong obtuse median carina, which disappears in front of the posterior margin. Anteriorly it terminates in a short obtuse hypapophysis. The suture of the neural arch is very coarse. Surface of the bone smooth.

| | M. |
|--|------|
| Length of centrum..... | .037 |
| Diameter, " anteriorly, vertical..... | .037 |
| " " " horizontal..... | .031 |
| " " posteriorly, vertically..... | .032 |
| " " " horizontally..... | .031 |
| Length of surface of parapophysis..... | .015 |

As compared with the *H. rogersii* of the New Jersey Cretaceous, this vertebra is shorter and stouter, and the extremities less concave; the suture for the neural spine is much coarser.

This crocodile was discovered in a bluish stratum, belonging to the Benton group, or No. 20 of Meek and Hayden, encountered in digging a well in Brookville, Kansas.* This point is considerably east of the exposure of cretaceous rocks seen near forts Hayes and Wallace. It is interesting as the first of the *Crocodylia* found between the Tertiaries of the Rocky Mountains and the Cretaceous of New Jersey.

It was given me by my friend Dr. Wm. E. B. Webb, of Topeka, to whom science is also indebted for the *polycotylus latipinnis*, I have dedicated the species to him.

Dr. Henry Hartshorne read the following paper on Organic Physics.

* This stratum is similar to that in which Dr. Hayden found the fish *Apsopelix sauriformis*, at Bunker Hill.